

Research Reports

An Investigation of Elephant Seal and Sea Lion Mortality on San Miguel Island

It has been reported in the news media that numerous elephant seals (*Mirounga angustirostris*) and California sea lions (*Zalophus californianus*) have become ill or have died as a result of the Santa Barbara oil spill, which was first reported on 30 January 1969. The first author, a veterinary clinical pathologist who has worked with seals and sea lions for several years, was requested by the National Parks Service to investigate these reports. The authors made trips to San Miguel Island on the 7, 9, 11, and 16 April, and on 1 and 2 May 1969, to make observations and collect specimens for laboratory examinations. The findings made during these trips were as follows:

7 April: We examined elephant seals for several hours and could find none which appeared ill (illness in this case being defined as lack of energetic arousal when nudged, poor body fleshing, or purulent nasal or ocular discharge). There were two elephant seals which appeared to have died within the previous 4 to 5 days. One large bull had a puncture wound on the head and deep lacerations over the body, and was evidently killed in a fight. The other seal was a young female. There were a limited number of petroleum smudges on her skin. The organ tissue was too far autolized for meaningful histology or bacteriology, but selected specimens were tested for petroleum residue by chromatography and infrared spectrography. The laboratory results were negative. Several other elephant seal carcasses were seen, but the leathery appearance of the skin and condition of internal tissue suggested that they had been dead for some time—probably several months.

9 April: We found one dead elephant seal on this trip (in addition to the ones found on 7 April). This was an animal which appeared to be under a year of age. There was no evident petroleum on its fur. Liver, subcutis, kidney, gastrointestinal tract, and lung were analyzed for hydrocarbon residue. The results were negative.

11 April: Preparations had been made to take blood samples for petroleum analysis from several live elephant seals. This involved transporting special restraining equipment to the island. We had no trouble getting the elephant seals into the restraining case and taking blood. One female had petroleum on her fur, a purulent nasal discharge, and was lethargic. We decided to bring this one back to the Marine Bioscience Facility for treatment. She responded well to antibiotics and appears to be clinically normal at present. No more dead elephant seals were seen on this trip, but a number of aborted California sea lions were found. We brought back two of the fetuses for

petroleum residue analysis. Laboratory findings revealed no petroleum residue in any of the blood samples or sea lion fetuses.

16 April: No new dead elephant seals were found. One young elephant seal had a nasal and ocular discharge and also lesions on the body suggesting combat. There was no evident petroleum on its fur. Its rectal temperature was 100 F. The rectal temperature of several other elephant seals which appeared to be in good health ranged between 95 and 97 F. One elephant seal in the area of the shore affected by the petroleum had a moderate coating of oil on its fur. The behavior of this animal was normal and its rectal temperature was 97 F. No indication of prior or incipient illness was noted.

1 and 2 May: Eleven newly aborted sea lion pups and one live adult California sea lion who had just aborted were brought back from the Island. Uterus, ovaries (removed by ovariectomy), and blood from the adult were tested for hydrocarbons, DDT, and DDE. These results were also negative. Kidney, liver, and spleen from the 11 aborted California sea lion pups were also tested for hydrocarbons, DDT, (pesticide pests sensitive to 1.0 ppm) and DDE, and these, too, were negative. In addition to the spectrographic and chromatographic analyses of the adult and fetal sea lion tissue for hydrocarbons and pesticide residue, serologic, histologic, bacteriologic, and virologic tests were made. The results were as follows.

Adult Tissue

Histology of Uterus and Ovaries: Metritis of the left horn was found and was characterized by endometrial hemorrhage and inflammatory cell infiltration between muscle bundles and perivascularly. This was evidently the horn from which the aborted fetus came. The right horn showed only mild inflammatory cell infiltration of the endometrium. These pathologic changes did not tell us whether they were related to the primary cause of abortion or occurred as a result of abortion. There was no evidence of pathology in either the left or right ovary.

Serology: A blood sample was analyzed for brucellosis, leptospirosis, salmonellosis, and mycoplasmosis, using agglutination tests. The results were negative.

Bacteriology: Swabs from the endometrial surface and from just below the surface were incubated on 4% sheep blood agar plates at 37 C, aerobically, in increased CO₂, and anaerobically. There was no growth at 5 days.

Virology: An endometrial preparation was inoculated onto WI-38 (human embryonic

lung) cell cultures. There was no cytopathogenic effect (CPE) at 3 weeks.

Fetal Tissue

Histology: Condition of the tissues indicated that all abortions were recent. No pathologic features were seen in liver, lungs, kidneys, or spleen. Foci of hematopoiesis were found in all splenic and hepatic samples indicating that these were not term fetuses.

Bacteriology: The fetal tissues (liver, spleen, lungs, and kidneys) were cultivated on 4% blood agar plates. They were incubated at 37 C, aerobically (in increased CO₂) and anaerobically. There was no growth at 5 days.

Virology: Selected specimens (liver, spleen, lungs, and small intestine) were also prepared and inoculated on to WI-38 cell cultures. There was no CPE at 3 weeks.

Definitive answers were lacking for the cause of death of most of the animals found on our trips to San Miguel Island. High mortality rates among seals and sea lions have been reported previously. R. T. Orr and T. C. Poulter (1965) noted that a study of Stellar sea lions by Evermann in 1921 on Ano Neuvo Island (off the Central California coast) revealed 100 live pups and 106 dead or dying at the time a count was made. A paper by Dr. Mark C. Keyes (1965) listed the major categories of death of fur seals in the Pribiloff Island as malnutrition, trauma, parasitism, miscellaneous infection, and gastrointestinal infection. A very important point made by Dr. Keyes is that the environment is most important to the evaluation of mortality. The understanding of the causes of death of animals on San Miguel Island obviously requires a knowledge of their normal mortality rate and the major causes of their mortality over the years. This information would most certainly facilitate an objective and enlightened understanding of the effect of short-term environmental alterations such as the Santa Barbara oil spill upon the seal and sea lion populations.

References

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- Keyes, Mark C. 1965. Pathology of northern fur seal. *JAVMA*, 147 (10): 1090-1095.
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